Science Council of Canada

Speech

Science Council of Canada
Conseil des sciences du Canada

Speech

Notes for an address

to the

Macdonald Royal Commission

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"Technology and Canada's Economy"

by

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(28)

There is a major question for public policy today. In a world where massive investments in new technologies are needed in order to be competitive, and where technology changes very rapidly and can be outmoded very quickly, can any small country make it? Is it possible for any small country, by picking niches for itself, to succeed given the risk that the niche it happens to pick could be eliminated in the next go-round, when the next technologies appear on the scene?

It is much easier for a broadly based country to face the risk that a few enterprises might go under and a few new ones come up. Yet we all agree that we need to focus in Canada. There is a difference of opinion as to whether the focusing should be done partly by government or entirely in the private sector. But we all sense that we are too small to do everything. Given the risks of shifts in technology, there is a temptation to join our small economy to a larger group. Unfortunately, for us there is no larger group. There is only a group of one, beside us, and that is the U.S. In any kind of so-called partnership with the U.S., we all know the difficulties for Canada. We are not one of seven or ten fairly equal, such as the E.E.C.; we are in fact a very tiny outpost alongside the outposts that they already have. We are the periphery of their periphery. The danger to our national identity over the years is very serious.

That is the dilemma. We have these Royal Commissions every thirty years or so to re-examine the problem. If you agree that technology will be the determining factor in the world competitive situation for the next couple of decades, rather than raw materials (which up to now have served us very well) -- if you agree that such a shift is occurring, we are obliged to take much bigger gambles than would ordinarily be prudent. We have to be as broadly based as it is possible for a small country to be, but we have to admit that, if we are not going to throw our lot in with the U.S., then we must take the risks of making some choices.

Now, I will say something about the question of choices. Who ought to make these choices? We are told that the private sector consists of all these wonderful entrepreneurs who are seeking market opportunities and, on the other extreme, the public sector is made up of some stupid bureaucrats, isolated in an office in Ottawa. Neither of those extremes is true. The truth is that our country does not have a whole lot of active entrepreneurs keenly seeking each market opportunity. It is too small; we have not been oriented that way; we are too geographically dispersed; most of our pools of capital are large aggregations, mostly resource-based. In short, we are not an entrepreneurial country like the U.S. Furthermore, our investors have easy access to the U.S. market, which is broadly based.

In addition to that, we have whole sectors, huge industries, where the country has few or no representatives at all in the private sector to make such decisions or to seek these opportunities. We have precious little in biotechnology, although we are all pulling for Allelix and hoping it succeeds, and there are a couple of smaller companies. We have very little representation in one of the biggest growth industries in the world, the pharmaceutical industry. We have virtually no representation in the medical devices industry which is, again, one of the fastest growing areas in the world. We have virtually nobody in the new materials that we hear about. We have some in engineering plastics and we have potential from a university department in the superplastics. But there is nobody producing industrial ceramics in this country and there is almost nobody doing composites. Precision machinery is needed for the advanced technologies and we hardly produce any in this country. We lost almost the entire production machinery industry, even in fields which are ours like forestry and mining. Take advanced robotics -- the natural people to produce a robot for a small manufacturing company would be the company that is already making equipment for the small manufacturing company, but they are not here! We have nobody in the fine chemical industry to speak of; most of the chemicals produced here are bulk commodities produced from Canadian petroleum and natural gas feedstock. Computer hardware is another where we are not well represented.

So it is all very well to say that the government should make no choices and wait for the private sector to make the choices, but what do you do when the private sector is not there? You also have to ask yourself what happens when the private sector is there but is obliged not to enter, because they are a branch plant whose job it is to do something different from moving in to new technological opportunities? Their job, usually, is to market in Canada products developed outside. So a large portion of our private sector may be there, but they may as

well not be there if you are expecting the private sector to respond to technology opportunities in Canada. Because they have no mandate to do so in a good many instances. Not all. Some branches do a fair amount of research in this country and some have world product mandates. But I am saying there are many, many who do not.

I do not like the notion of governments making major choices, but I cannot just say "Leave it to the private sector"; our problem is that our private sector is often not there. Where we have a big private sector, namely in the resource area, most of those folks know very well that they should be diversifying and they want to. But they have no background in these other fields; it is not part of their expertise. They may set up a venture capital arm and they hope that somehow they will figure it out. In addition, most of them are short of cash at the moment and it is not going to get any easier, if predictions are correct.

We must, by all means, improve the climate and encourage the private sector to make whatever decisions it possibly can. For sure, they are going to make more market-oriented decisions than some guy in the Department of Communications! But let's not believe that that will be sufficient. We have and we need a mixed economy in Canada. There has to be some role for public policy. We cannot just take the comfortable view that we need no policy at all. Admittedly no policy would be better than bad policy but we nonetheless require some attempts at policy.

If you think we are not making choices now, please rethink that. Our policy so far has been to support our resource sector. When we build railroads, when we build roads to remote areas -- it is to support our resource sector. Double tracking the rails is a decision in favour of the resource sector; this may be a logical decision for a country like Canada but it is a choice, and an expensive one. That is all I am saying. We are making choices all the time; what I am saying is that other choices will have to be made to favour human resources, not just natural resources. Money used to build a coal port in B.C. or to build a railway to the port is money that could have been used in lasers or computers. Choices are already made by government and we should not pretend otherwise.

The science and technology situation in Canada is quite good in terms of basic science and even our understanding of some of the new technologies. The problem is: 1) the application of new technology in our traditional industries is a little slow and 2) we do not succeed enough in the exploitation of technology in the form of products to be sold abroad. We all agree that in most of these new technologies, it is the

international market that we are talking about. But our industrial mixture seems to mitigate against the successful commercialization of the otherwise rather good intellectual property which resides in this country. As John MacDonald of MDA says, folks are "pushing on the rope". He is absolutely correct, that we have to have people out there in the marketplace to pull on the rope! Then, things will orient themselves in a much more logical way. The problem is that we do not have sufficient representation out there in the international marketplace!

This is not to say that, if we had a broadly-based private enterprise economy, we would necessarily need no government policy. Even the U.S., which is probably the broadest of all the economies, uses its Defence Department to build up certain technological advantages, and does so quite consciously. It is no accident. European countries certainly set priorities as do the Asian countries. Even in broad economies, there seems to be some role for government; but here in Canada, I just do not think there is any question about it.

If that is the overview of the situation, what do we agree on? You have heard the experts and their view is pretty clear. The rate of new developments and fundamental discoveries is very high and there is an interaction between them. If you have a better computer, it helps you to develop better materials; better materials then help you develop a better computer, and so on. The lag period between a discovery and the time that it is marketed is very short nowadays and it seems to be getting even shorter. We are entering a golden era of technology with a lot to look forward to. Amazing things, virtual miracles are going to happen in the next little while. There is no reason for us to be negative about this; but we have got to be part of it.

We all agree that a very large portion of world trade will be in high value-added, knowledge-intensive goods. I do not say "high tech"; I say "knowledge-intensive" because high-tech just sounds like computers, when it is really all the areas that are research-based: new materials, chemicals and so on. And a much greater percentage will be high value-added rather than bulk materials and commodities. Even CNR, a transportation company, sees the effect of this and is planning for it. We know that Canada has a high and increasing trade deficit in those high value-added goods. At the moment, it is being overcome by our successful trade surplus in other fields, partly due to our low dollar. But the question is, will the future maintain that pattern? Or will we ultimately find the trade deficit in the growth areas overtaking us as a country, if we continue to rely on our past areas of success?

We are advising you not to rely on the past in this regard. The interesting thing is that Japan is setting the agenda for us. Whether we like it or not, it is true. Japan is only doing what they do out of necessity. A resource-poor country, they became manufacturing-oriented and have advanced all those forms of science and technology that allow the substitution of cheap materials for expensive ones or that permit the efficient use of materials: less energy use, less wastage of material in the manufacturing process, fewer moving parts and so on. They have done it for their own reasons, but having set the agenda, we have got to follow it. We cannot turn back the clock on this. Sadly, Japan's "menu" is exactly the one we would not have wanted. We are not looking for ways to save resources; we are looking for ways to sell resources! Still, we have no choice; this is the menu and we have to choose from it.

The survival of our traditional industries clearly depends to a large extent on our ability to adopt new technology. As David Slater of the Economic Council has pointed out, Canada seems a bit slow in this regard. And, as consultant Zavis Zeman says, we have no organized means of bringing in technology from other countries; that is something we very much need. Nobody at the Science Council is suggesting that we should stop bringing in technology from abroad; quite the opposite. All of us feel we should bring in the best we can get from abroad but we should bring it in under the best terms possible! And the best terms possible usually require a good licencing arrangement or a joint venture of some kind. Usually, you have something to bring to the partnership as well. If you just essentially wait for them to sell it off the shelf, then they probably have a much more advanced model which they are already going to use back home. If you want a seat at the meetings where the latest technologies are discussed, you have to have something to contribute to the discussions. So it is not just a simple matter for the Commission to say Canada should import more technology; of course we should import more technology. The point is: we have got to be in a position to import it under good terms, and that means we need some capacity of our own.

Let us look at our traditional industries for a moment. Our resource sector seems slow to adopt new technology nowadays; they do not have cash and they are under very severe competition. Some have supply problems, such as in forestry. Traditionally, they have been very low in their R&D expenditures. Our resource sector is having to improve in this regard and I think they are. Still, by and large we are still not spending enough on research in our resource sector.

Agriculture is a very good area for Canada and I hope the Commission will recognize that. That is becoming more and more a research-intensive industry, a knowledge-intensive industry -- in fact, it should not even be called a "natural resource" industry any more except for the fact that you need the soil and we tend to be losing some of it. Canada's great success in agriculture has been largely a reflection of its ability to do research and transfer it out to the community of users. This is an excellent example of federal-provincial cooperation; the federal lab does the research and then the provincial agriculture representatives carry the message, in the form of continuing education, to the farmers. The farmers implement the results of the research and the whole thing occurs faster than in most manufacturing industries. It is really quite remarkable.

In manufacturing, we are way behind, although we are now trying to modernize. Perhaps one problem was that we did not have our own machinery industry in this country.

There is a serious question here. Might it happen that too large a share of investment is put into the traditional industries? We would all prefer to escape the dilemma of "sunrise" vs. "sunset" industries but we may have to face up to it at some point. There is room for both, but when it comes to very large investments to modernize an industry that faces serious difficulty in the long run, are you better off to use the money to get into new industries that might be growth opportunities? Frequently government is asked to make these decisions. They are called "bail-outs" or they are called "modernization grants"; politically, of course, it is a very difficult question but I would say that, if you think certain industries are going to have a declining share of the world market, let them be modernized, but leave it to the private sector to do it and to pay for it.

Take a steel company in Hamilton, for instance. They have to spend about three-quarters of a billion dollars on a new furnace even though there is not much wrong with the old furnace. Their customers are now demanding a higher quality steel and they can only get that by a new method. Now that is a rather defensive investment and it is a lot of money, especially at today's interest rates. Do they make the investment to keep their customers or do they diversify into new fields? These are tough decisions facing many of our traditional industries. If the government is asked to help with that one, how should it respond? Some of us on the science side like to duck it, but the Commission, I am afraid, will have to face up to the question. My own view is that those modernizations where the future does not seem to be one of rapid growth should be left to the private sector.

What about the job question? Knowledgeable people disagree on the matter. The reason I worry is that I am not sure that the productivity-enhancement effect of the technology will necessarily also be wealth-enhancing. You might say that is ridiculous, ---a contradiction in terms; but I remind you that if you do not increase your market, but just hold what you have in the face of competition, admittedly you might reduce your costs by substituting capital for labour, but the extra profit will probably not make up for the people that are laid off and need to be supported. And so my concern is that the wealth creation of each of these new investments cannot be taken for granted. Many of these new investments will be for quality purposes or for defensive purposes and will not necessarily be accompanied by a large increase in market share or a large increase in wealth. Obviously to the extent that it decreases cost, it increases wealth. But that wealth may not be sufficient to create an equivalent number of jobs; at least not in Canada. Consider, after all, that most of the machinery will be imported and therefore there will not be the multiplier effect within the country.

Even if sufficient wealth would be created by the productivity enhancement so that people would have more money to spend, can we be sure that the ordinary market mechanisms will distribute that money in the form of jobs? Will that automatically happen? We can all think of ways to spend money, but that includes imported items, or a trip to some other country. It is not certain that we are going to spend it on Canadian goods or Canadian labour in this country. Where Canadian labour would be required and where machines cannot do the job better would be in the human services sector and in the cultural and entertainment sectors. But the care of the ill, the aged, the handicapped, the retraining of people, these huge, social and human services have in some instances been excluded from the marketplace and are supported via the tax structure. It may be necessary to introduce a market component into some of those human services jobs, if we want to have whatever wealth is created distributed in the form of jobs; the alternative, public welfare payments or expansion of public sector employment seems hard to contemplate without much higher taxation levels.

I think, personally, that the net job effect will be negative but I think it more important to make sure that we create wealth in this country and to separate in our own minds wealth creation and job creation. Wealth creation should not be encumbered by the question of "How many jobs is it going to create?" or "How many jobs is it going to stop?" That is sure death for the country. Create the wealth and then, on a separate page, if you like, figure out how to distribute it in the form of work. There is lots of work to be done in society; it is just a matter of finding the right way to distribute it

and the right way to make the marketplace more effective. That is my personal opinion, by the way, and not necessarily what the Science Council believes.

I have mentioned that there are certain features of the new sectors we are talking about: they are 1) export-oriented, 2) long-term in perspective, 3) high-risk and 4) high R&D spending. All four of those features are things Canadians are not used to. That is a serious institutional problem for us. Our view is that it will not be enough simply to say that all will be well with Canada if we only work a little harder and more harmoniously, improve our confidence and tackle the deficit. We believe the game has fundamentally changed.

You have asked for some policies. The first thing I would say is that it depends on how specific we need to get. How much, if any, planning is required and at what level? That is the real question. At the broadest level, the macro-economic, we have said nothing to you. We all assume that monetary and fiscal policy, the general business climate and so on will continue to be a responsibility of government and one can only hope that good advice is available.

But then there is the second level of planning, at which science and technology in general is supported. What are some of the policies you might adopt to give general support to science and technology?

1. There are R&D incentives via the tax system. Business does not complain about them. In fact, they are among the most generous of any of the countries I know of. I see no necessity to improve the tax incentives on R&D, although it would be useful to broaden the definition of "Development".

2. There is a need for better support for education. That means better teaching of maths and sciences in primary and secondary schools. It means support in universities, particularly for schools of engineering and management. And it means that the management schools must start training entrepreneurs and people who understand technology. The habit has been to take a Bachelor of Engineering degree and then go on to take a Master of Business Administration. Well, that takes a very long time and there is a lot of wasted effort. The schools of management and engineering should form joint programs so that people come out with an understanding of both management and engineering. Furthermore, because people are disappointed with the quality of Canadian management and rightly so, I think, continuing education for these managers is needed and our Business Schools should respond more vigorously to that need.

3. Our businesses need better information about science and technology. Canadian companies are simply not getting the latest information. In Japan there are mesaures taken to make sure that intelligence is drawn in from all around the world and transferred to their business people very rapidly. We need measures to do that. Our Embassies have to be beefed up, for instance, to actually be seeking information on technology and it should be one of the major functions for certain key Embassies abroad. There has to be a focus here in Canada for drawing that information in and distributing it.

4a. The venture capital industry is not a mature industry in this country. In the U.S., it is much easier to get venture capital but, more than that, you get a lot of management and marketing expertise with the venture capital. Perhaps we require tax breaks for people to go into the venture capital industry so that it will develop the required maturity.

4b. We need as well, changes that will draw banks into venture lending. The Science Council suggests that banks should be allowed, perhaps in partnership with other institutions, to set up venture lending with a profit-sharing aspect.

5. We have heard about research grants to universities and the need to support excellence. On this, more money is needed and longer term guarantees should be given. However, universities must "rationalize" and not try to do everything at every university. Universities should work together in certain areas, and to divide up other areas so that only the best research will be funded; we do not need a lot of mediocre research on every campus. We certainly have to maintain good basic research and here we should support excellence and let the scientific community decide what it wishes to study, when it comes to basic research.

6a. We should improve the technology transfer from our government labs but that is never really going to happen without some changes. Some technology will be transferred of course but, generally speaking, you should not start out by having one group of people run the lab, and then another group of people who come and shop there from time to time. If technology transfer is your main goal, then set up the labs on a joint basis in the first place. Long-term research programs ought to be jointly done between government and industry. Even if government pays for the whole thing, industry should be closely involved in the planning of the research program and in carrying it out, either in a special lab somewhere or in their own company labs. A system of cooperative longer term research exists in Japan and we can emulate that here.

6b. I agree with those who say that people are the best thing to transfer. I would like to see a program whereby some governments labs actually offer their people to industry for periods of time. Let them take their ideas with them and let them work on them in the industry's lab. The government could pay a good portion of the salary and it would still be cheaper in the long run.

7. Companies that are willing to adopt genuine World Product Mandates in Canada should receive certain advantages, such as elimination of capital gains tax. The same would apply to Canadian companies that were obviously under no constraint from exporting. If you are in the export business, if you are in the development business, then you should be excluded from capital gains taxes so as to differentiate between those companies that are just branch plants and those companies that are truly export-oriented.

8. We need a brokerage to help commercialize the intellectual property that we have in the universities. There are people who would like to set up business ventures using new discoveries but they do not know where to find them. People in Japan requested information leading to joint ventures with some of our medical scientists, something which I think we should do, yet it is hard to help set up such joint ventures. A good broker would know who's who and what is being done at the universities and will be able to help create such joint ventures. The best joint ventures in those instances would allow the Canadian branch of the venture to sell into the full North American market. Usually that precludes a U.S. based partner, but not always.

9. We need better protection and retraining for labour when new technology is introduced. Apart from the humanitarian side of giving protection to labour, which is only fair and reasonable, it is in the interests of business and our economy to avoid a backlash and resistance to technological advance.

Those are some general measures for science and technology.

What if we wish to support specific technologies or specific sectors? Here I will be blunt. I believe what is required is positive protectionism, by which I refer not to tariffs or other barriers, but to the kinds of help that our competitors give. We should not rely for long on protection and quotas for industries that are dying but there should be help for infant industries in chosen areas of new technology.

The "positive protection" should be short-lived. It must come to an end at a certain known point. But it should be there for chosen areas. When I speak of positive protection, I am

speaking of favourable conditions for procurement, research grants, special low-interest loans, joint developments with government laboratories and so on. That is what I mean by positive protection. Procurement is terribly important and it should be one of the major tools used by government. This raises the issue of aggregating provincial markets for the purpose of procurement. One of our big problems is that we miss out on many opportunities for procurement possibilities because there are different provincial jurisdictions. To aggregate those markets, we may require some federal incentive.

For example, a provincial government might introduce a measure which asks hospitals to give a 10% "sleeve" of favoritism to Canadian companies. But if hospitals were actually to do that, it probably would come out of their already tight budgets. If you want a 10% favoritism, then you must subsidize it everytime it is used. That might invite some companies to deliberately inflate their price 10% but that might be a risk we have to run in order to gain an industry.

To enter those new fields which are important but in which we are not represented will probably require partnerships between the government and the private sector. The private sector itself has not moved into those growth fields and there may be start-up losses. A partnership in which the government is willing to accept some of the burden might get us into those key fields like pharmaceuticals or fine chemicals, for example.

As to selecting areas of technology, the Science Council, with the help of MOSST, will be undertaking a massive consultative exercise to bring the right people to meet each other. The leading edge scientists will be brought together with people from industries. Information about those scientific discoveries which are just about to emerge from the lab will be fed to the companies that might need to know. If the right people are brought into contact with each other at the right time, we hope that something useful will be stimulated. Occasionally, what it will stimulate will be a request for money from government for further action.

Grants from government are still necessary for the simple reason that a lot of the smaller companies and start-up companies do not pay taxes, so tax incentives cannot help them. The trouble with grants is that they can rarely be done in a fast simplified manner. They are rarely worth the time and trouble a small business person spends trying to get them. An exception often mentioned is IRAP. Still, we need grants but they must be fast and simple or else they are counter productive.

I started this discussion with mention of macroeconomic choices, then general technology and then specific technologies. Now the final level of choice is that of specific firms. I do not see too much call for that, but occasionally it is not a bad idea. Spar Aerospace is a chosen instrument of government and has been very successful. It is sometimes better to have a chosen instrument than a crown corporation.

Well, I think I have spoken enough for you to detect my bias. I prefer the marketplace but I see problems in Canada in that, among the various factors that come to the marketplace: Labour, goods, people, consumers and capital -- capital does not have much national feeling. Canada is in a very difficult situation vis-à-vis the U.S. It is easy for capital to move and we are not going to change that. It would be far too troublesome to try. But because of that, you cannot necessarily rely on capital to say "Let's start an industry here because it would be good for the country." If people can make an extra or a safer dollar investing in a new risky industry in the U.S., they will. If it is necessary for Canada to have certain industries, and if capital has been reluctant to move into them, then we must have government policies to encourage it. A passive response on the part of government makes the tacit assumption that capital has national feeling, an assumption that, in North America at least, would be wrong. Capital has continental feeling, and an international marketplace.

So for those reasons, government cannot simply abdicate. It is important for government to consult, to inform, to motivate, to build infrastructure, to build linkages and to make choices, both broad and specific, including help and "positive protection" for a major investment in important new industries.

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by

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Chairman
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to the

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The economic foundations of all advanced industrialized nations are being shaken by the movement of technology to low wage countries. This results from the rapid spread of basic education and skills, along with the development of technology requiring less skill to operate. This movement of advanced means of production to lower wage areas places a downward pressure on the wages and living standards of all OECD countries, who then can react in one of two ways.

The first response is, of course, protectionism for threatened industries. This is short sighted and is dangerous to the overall world economic development; in the long run it causes costs in the protected country and prevents efforts at progress and adaptation. Unfortunately, there seems to be a trend in this direction at present and we must do what we can to resist it.

The second response is one which has been pioneered by Japan and can be described as the "knowledge escape-hatch". Let me describe this. Accepting that many industries will be lost to newly industrializing countries, we must remember that the incomes will be increased in those countries and that these new incomes will have to be spent on goods and services. The role for advanced nations in these circumstances is to produce those goods and services which depend upon the remaining advantages such countries have. These advantages are considered to be a super-abundance of very advanced skills and knowledge, as well as a considerable base of accumulated capital. The trick is to find products and services that are heavily dependent upon very large amounts of extremely advanced knowledge.

Serious questions are raised by this strategy. Let me review some of them.

1. Can any country be entirely successful in this effort, given that even advanced products become standardized rather quickly and given that even sophisticated technology, once standardized, can be shifted to lower wage areas?

2. Even if some countries can be successful with this strategy, can all advanced industrial nations escape through the same hatch? In other words, will the new earnings of the NICs (newly industrializing countries), be sufficient to support all these knowledge-intensive industries throughout the advanced world? Won't much of this wealth find its way into purchases of ordinary industrial products from other low wage areas and into purchases of food, energy and other resource materials?

Advanced countries can sell to each other various productivity-enhancing products with which to reduce costs and hold on to certain traditional industries and markets. Overall, however, can that make up for the enormous competitive pressures on the huge bulk of such traditional industries?

3. To what extent should a country like Canada, which has both an advanced educational and industrial system on the one hand, and a vast array of natural resources on the other, try to compete in the "knowledge-intensive" sector? Can we count on our resource products to be the same solid economic bases in the future that they have been in the past or must we too compete more vigorously for the knowledge-intensive market I have described earlier?

A subsidiary question is whether, even if it wished to, Canada could successfully shift from a reliance upon natural resources to the production of high value-added products and services. A country's culture and institutions tend to fit with its economic necessities and cannot be easily changed. Furthermore, there is a limited amount of capital, even in a rich country like Canada, and choices sometimes have to be made between the familiar and tangible resource sector and the risky business of new technologies.

When we look at our traditional source of wealth, namely the export of natural resource products, we notice changes in the world economy that are very similar to those which I have described in the field of manufacturing. Just as lower wage skilled people compete with our own workers and just as new technology removes our advantage by making some skills obsolete, lower cost substitute materials compete with our resources and new technology makes some of our resource products obsolete.

We must remember two things, when discussing our resource sector. In the first place, we generally do not have supply problems, although there are some exceptions. In the second place, the outlook for demand (and price) differs from one resource industry to another.

To look at the supply situation in greater detail, there may be local shortages in our forest industry about ten or fifteen years from now. Some of this can still be avoided if we change our habits and spend heavily in forest management and research. Our fishery is facing some supply and mismanagement problems but these can be corrected and, furthermore, there is great potential for aquaculture in Canada, provided some group will take the initiative. Conventional oil supplies appear limited but advanced recovery methods and new techniques for dealing with heavier oils, as well as some good reports from offshore drilling, are all hopeful factors. All our remaining resource products would appear to be in good supply positions for some time to come, bearing in mind of course that supply frequently depends on the price being sufficiently high to justify exploitation of reserves.

Our concern lies in two problems: 1. the outlook for medium and long term demand and 2. the appearance of low cost, sometimes government-subsidized, competitive producers in parts of the world that are desperate for foreign currency.

On the positive side, we expect a growth in demand for our food products, always provided that we do sufficient research, including biotechnology, to retain our lead in the production of high quality plants and animals. As far as energy is concerned, the questions of price and demand growth are uncertain but we can count on reasonable markets for these products.

Our forest products industry may benefit from the increased need for paper in the information era, especially as more people around the world become prosperous and highly educated. Also, more building materials may be needed. On the other hand, however, electronics may yet substitute for newsprint in the North American market, new building materials might compete with wood and there is increasing competition from other countries with forest industries.

As to metals, we have very serious worries. Except for aluminum, where we import the raw material and have the advantage of our cheap electricity, we find our metals under very considerable price competition from other countries. New technology allows people to get more product out of less raw material, more use out of smaller products and all with less energy consumption. Furthermore, substitution of advanced industrial materials is occurring, removing certain markets from our metal producers. Future demand for metals such as copper, nickel, lead and iron is shaky; zinc, gold and silver seem to have better outlooks but things can change.

Canadians will want to maintain a standard of living equivalent to our American neighbours and to other advanced countries. (In fact, if we fall too far behind the U.S., we risk losing our best people there and even our autonomy becomes shaky.) We will wish to import high quality consumer and capital goods. To afford these in increasing amounts, we will need growth in our exports. As you well know, it has been growth in our resource sector exports, that has always allowed us to consume imports in the past.

If resource exports become stagnant or reduced, then we must find customers for new, higher value-added products of our own, no matter how tough the world markets are for such products.

I am sure that Japan did not intend it this way, but it is Japan that now sets the research agenda for the industries of the advanced world. This research agenda emphasizes: 1. the substitution of cheap engineered materials for traditional resource-based ones and 2. products which consume less energy and fewer resources in both their manufacture and use. Japan wants to escape the need to use traditional resources since it is forced to import most of those commodities. Once a cheaper material with improved qualities is developed, or once a resource-saving manufacturing process is invented, the whole world has to use it to remain competitive in terms of price and quality. For Canada this research agenda is precisely not what we would have chosen since we sell the very resources that people are learning to avoid using. We have to live with these trends, however, and we must make very serious and painful decisions based on them.

You will be interested to know that we have over 800 single-industry communities in Canada, containing about 10 per cent of our population. Most of these are resource-based communities; many are in serious trouble; some are facing shutdown. This, combined with the restructuring in manufacturing, threatens to impose huge social and economic costs on our country during the transition period.

It may be very clear that bulk commodities are facing hard times and that only sophisticated, high value-added manufacturing and services will grow. It is simply impossible for us, however, to make an immediate wholesale change into advanced technology industries, nor would it be wise for us to try to do so. Our resources will remain important for many decades to come. Still, it is clear that there has to be a long term shift for our country and it has already started. How much time the world will give us is impossible to predict.

While this shift is going on, we must shore up our existing wealth base by modernizing our traditional manufacturing and resource industries to the extent that is possible. We must also build new technology companies to meet the needs of our traditional resource industry and must invest heavily in research to stay ahead in those resource sectors that can expect improvements in demand (e.g. agriculture). The big challenge is to start up sophisticated companies and help them orient themselves to world markets with which Canadians have been notoriously unfamiliar. There are opportunities for Canada and Japan to work together to solve some of these problems. Let me offer three suggestions in particular.

In the first place, I am sure that Canadian resource companies would welcome an infusion of Japanese capital and/or the signing of long term contracts at moderate but stable prices. In other words, since resources are as important to your survival as they are to our economy, and

given the risky nature of the business, as I outlined earlier, we would be pleased to have partners to share the risk with us and to benefit from consequent stability. This would be especially true, given the gloomy financial figures from some of our resource-based companies in the last few years and given the needs that we have for capital to introduce new technology, new processes, new management techniques and more research into both the upstream and downstream ends of the resource business. Japanese investment has already occurred but there is room for much more.

Still on the subject of the resource sector, there are many small Canadian companies that are potentially able to produce new technology for use in resource exploitation. These companies might well benefit from licensing arrangements or joint ventures with Japanese companies so as to combine their knowledge and their range of technological offerings. This is especially true in the field of resource exploration, offshore development, resource processing and the use of robotics in isolated or extreme circumstances. Remote energy sources and communication techniques are also matters which could profitably be dealt with by joint ventures.

Secondly, Japan could help us, and could benefit itself, by working with our university and government laboratory researchers in the commercialization of very advanced intellectual property. This is especially true in the field of health care since Canada has few representatives in the medical devices and pharmaceutical industries even though our medical and biological research is plentiful and highly advanced. We in Canada should set up "brokerage" firms to keep track of the advanced research in certain fields and to act as go-betweens in arranging joint ventures. New Canadian companies incorporating these ideas could combine with Japanese companies that have expertise in the production and marketing of such products. Perhaps the Canadian branch of such an enterprise could serve the North American market while the Japanese branch might serve the rest of the world. In addition to commercial benefits, there would be benefits of the two-way flow of new research knowledge.

Thirdly, I must raise again the traditional issue of Japanese willingness, or lack of it, to buy those sophisticated manufactured products that Canada does make successfully. We have excellent firms producing modern office equipment, telecommunications, lasers, remote sensing software, commuter aircraft, nuclear technology, farm equipment, rail control systems, and so on.

We have, since 1922 and until this past year, enjoyed a trade surplus with Japan, consisting almost entirely of the trade of resource products such as coal and wheat for highly manufactured Japanese goods. This year, the balance has shifted in favour of Japan by a small amount. What this reflects is the fact that higher technology goods are becoming an increasing portion of the trade of advanced nations and we Canadians are no exception.

Unfortunately we find that our trade deficit with the world in advanced technology goods is high and is getting higher. The most troubling aspect of it is that the higher the technology, the higher the trade deficit. Canada is a good and growing market for Japanese goods; it has been and will continue to be a stable and friendly supplier of essential food and energy commodities to Japan.
We are an advanced nation, however, with excellent technology to sell and all our companies ask is a fair chance to compete in the Japanese market. A better balance of purchases between resource commodities and higher value-added items will be an important aspect of Canada's economic restructuring and would certainly help the important and growing friendship between our two countries.

In summary, we believe that we are watching the beginning of a golden age of technology; an age where veritable miracles will be brought about and where discoveries and inventions will cascade, one upon the other, at a rate unprecedented in human history. That there will be shifts in the world economic order is undeniable; that there will be serious problems of adaptation is unavoidable. Together our countries can accomplish things which neither could do separately. It is in that spirit that this meeting takes place and that these words of analysis are offered. It has been an honour to share these thoughts with you. I look forward to questions and discussion.

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